(2 ½ Hours) **[Total Marks: 60]**

N.B: (1) All questions are compulsory.
(2) Figures to the right indicate marks.
(3) Illustrations, in-depth answers and diagrams will be appreciated.
(4) Mixing of sub-questions is not allowed.

Q1.		**Attempt the following (any Two)**	**(12)**
	(A)	Define simulation and discuss the advantages and disadvantages	6
	(B)	Explain simulation as a perspective of management?	6
	(C)	Explain the discrete-Event Simulation Approach for Telephone Call Centre Simulation	6
	(D)	Explain the neat block diagram the framework of the conceptual model?	6
Q2.		**Attempt the following (any Two)**	**(12)**
	(A)	Explain the difficulties of validation and verification in simulation ?	6
	(B)	Explain in detail the three methods of white box validation and verification?	**6**
	(C)	What is 2k factorial design? Discuss its limitation?	6
	(D)	What is simulation project success and how it is achieved?	6
Q3.		**Attempt the following (any Two)**	**(12)**
	(A)	Consider a population of 10000 people living in 10 kilometres and are evenly spread in the given area. Rahul doesn't know anyone in this area. If an infectious person is contacts other persons and latter gets infected by the probability of 0.1. The latent period of the infection is of 3 to 6 days to get exposed to the epidemic. On an average if 5 person/day get n factious and if the illness recovers in 30 days. Discuss and Design the behaviour of the individual person in the agent based epidemic model. Given the illness duration after latent phase is 15 days.	6
	(B)	Differentiate between analytical and simulation modelling.	6
	(C)	Explain movement in continuous 2D space.	6
	(D)	Explain the types of standard and customs networks used in anylogic. Draw neat diagram of each.	6
Q4.		**Attempt the following (any Two)**	**(12)**
	(A)	What are the different types of Triggers used in state charts explain the function of each?	6
	(B)	What is state chart? Draw and explain the state chart of laptop running on battery.	6
	(C)	Explain virtual time execution mode with respect to anylogic.	6
	(D)	Explain discrete event approximation of real world continuous process.	6

Q5.	**Attempt the following (any Two)**	**(12)**
(A)	Explain three phase simulation approach.	6 M
(B)	Explain welch model for plotting moving average.	6
(C)	Write a short note on grouping shapes.	6
(D)	Explain the use of camera in 3D multiple window.	6

(2 ½ Hours) **[Total Marks: 60]**

N.B: (1) All questions are compulsory.
(2) Figures to the right indicate marks.
(3) Illustrations, in-depth answers and diagrams will be appreciated.
(4) Mixing of sub-questions is not allowed.

Q1.		**Attempt the following (any Two)**	**(12)**
	(A)	What is a virtual server image? What is hardening process of virtual server images? Explain hardening process using neat diagram.	
	(B)	Discuss common threats and vulnerabilities in cloud-based environments and security mechanisms that are used to counter cloud-based threats in detail.	
	(C)	What is a threat agent? Explain role of threat agents.	
	(D)	State and explain use cases for Cloud Computing.	
Q2.		**Attempt the following (any Two)**	**(12)**
	(A)	Describe SLA monitor mechanism using neat figure. What is its use?	
	(B)	Explain the billing management system mechanism used in cloud management.	
	(C)	What is failover system mechanism? Give two basic configurations of Failover systems.	
	(D)	Explain the automated scaling listener mechanism used in cloud computing.	
Q3.		**Attempt the following (any Two)**	**(12)**
	(A)	What are heartbeats? Explain Hypervisor Clustering Architecture.	
	(B)	Explain the dynamic scalability architecture used in cloud computing. Explain different types of dynamic scaling used.	
	(C)	Explain how zero downtime architecture establishes failover system?	
	(D)	Explain any one advanced cloud architecture in detail.	
Q4.		**Attempt the following (any Two)**	**(12)**
	(A)	Describe common types of metrics used to evaluate the estimated costs and business value of leasing cloud-based IT resources.	
	(B)	List some online SaaS offerings. Discuss any one SaaS offering in detail.	
	(C)	How pricing models used by cloud providers are defined? Discuss in detail.	
	(D)	Explain the architecture and administration of IaaS cloud delivery model from the point of view of the cloud provider.	

Q5. **Attempt the following (any Two)** **(12)**

(A) What is a Service-level agreement (SLA)? Why it is used? Explain various measurable QoS characteristics.

(B) Explain Service Performance Metrics.

(C) Describe cloud balancing architecture. What mechanisms are used in implementing cloud balancing?

(D) Explain Elastic resource capacity architecture. Why it is required to be used in cloud computing?

(2 ½ Hours) **[Total marks: 60**

N. B.: (1) **All questions** are **compulsory**
(2) **Figures** to the **right** indicate **full marks**.
(3) **Assume additional data if necessary** but state the same clearly.
(4) **Symbols have their usual meanings** unless stated otherwise.

Q.1 Attempt **any two** of the following **(12)**
a) What is the importance of Congruence in Cryptography and Crypt-Analysis? What are the properties of Congruence? **6**
b) State the purpose of Euclidean algorithm. Explain it using suitable example. **6**
c) Explain with example the Chinese Remainder Theorem. **6**
d) State and explain the Fermat's little theorem and its use in cryptanalysis. **6**

Q.2 Attempt **any two** of the following **(12)**
a) What are block cyphers? List various block cypher algorithm modes. Explain any one. **6**
b) What do you mean by stream cypher? Explain its working. **6**
c) What is IDEA algorithm? Explain the encryption process used by IDEA algorithm. **6**
d) What is a hash function in reference to information security? What are its requirements? **6**

Q.3 Attempt **any two** of the following **(12)**
a) Explain with example the RSA algorithm. State possible attacks on RSA. **6**
b) What is the purpose of Diffie-Hellman Key Agreement Algorithm? Explain with suitable example. **6**
c) Explain the concept of public key Cryptography. **6**
d) Explain the Miller-Rabin Algorithm and its use in security. Give example. **6**

Q.4 Attempt **any two** of the following **(12)**
a) Explain the use of Station-to-station protocol in Key Distribution and Key Agreement Scheme. **6**
b) What is Secure Sockets Layer? Explain. **6**
c) Write a note on Certificate Life Cycle. **6**
d) Write a note on Pretty Good Privacy for secure communication. **6**

Q.5 Attempt **any two** of the following **(12)**
a) Briefly describe the Mitchell-Piper key distribution pattern. **6**
b) What is ElGamal signature scheme? Explain the key generation, signature generation and verification algorithms. **6**
c) What is HMAC? Briefly explain its operation. **6**
d) What is triple-DES? Explain the encryption and decryption using triple DES **6**

(2 ½ Hours) **[Total Marks:75]**

N.B: (1) All questions are compulsory.
(2) Figures to the right indicate marks.
(3) Illustrations, in-depth answers and diagrams will be appreciated.
(4) Mixing of sub-questions is not allowed.

Q1. **Attempt the following (any Two)** **(12)**

(A) What is partitioning? Explain the term Centroid and clustroid.

(B) List and explain working of K-Medoid algorithm.

(C) What is point assignment method of clustering? Discuss the working of K- Means algorithm.

(D) Write a short note on CLARA. List its advantage and disadvantage

Q2. **Attempt the following (any Two)** **(12)**

(A) Write a short note on Rule-Based Classification .Where & How are they used.

(B) What is classification? How does it helps in intelligent data analysis.

(C) What are Support Vector Machine . Discuss its advantages and disadvantages.

(D) Discuss the following term:-
1. Confusion Matrix
2. Lift Curves
3. ROC Curves

Q3. **Attempt the following (any Two)** **(12)**

(A) Define the term SVD. Discuss its working.

(B) Let M be the matrix of data points

$$\begin{pmatrix} 1 & 4 \\ 2 & 3 \\ 3 & 2 \\ 4 & 1 \end{pmatrix}$$

(1) Compute eigen value and eigen vector using PCA technique

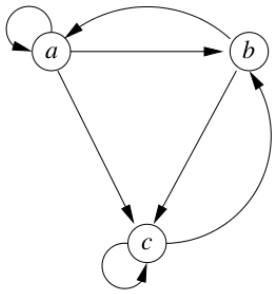
(C) What happens when we eliminate duplicate rows and column in CUR decomposition?

(D) Write short note on PCA

Q4. **Attempt the following (any Two)** **(12)**

(A) What are random walks? Explain with the help of an example.

(B) Consider the following hypothetical web diagram.



1) Compute the PageRank of each page in above diagram, assuming $\beta = 0.5$.

(C) Discuss how link spam works? Discuss the Architecture of a Spam Farm.

(D) How Root-Mean Square error works? Discuss with an example.

Q5. **Attempt the following (any Two):** **(12)**

(A) Write a short note on Streams and Parallelism.

(B) How Bayesian Network help in taking decision of problem. Explain with help of an example .

(C) Consider the following Matrix M

$$\begin{pmatrix} 1 & 2 & 3 \\ 3 & 3 & 3 \\ 5 & 4 & 6 \\ 5 & 5 & 5 \\ 1 & 3 & 5 \end{pmatrix}$$

1. Find the rank of the Matrix M
2. Compute M^TM and MM^T.

(D) What are recommendation systems? Discuss its two types in detail.

(2 ½ Hours) **[Total Marks:60]**

N.B: (1) All questions are compulsory.
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(3) Illustrations, in-depth answers and diagrams will be appreciated.
(4) Mixing of sub-questions is not allowed.

Q1.		**Attempt the following (any Two)**	**(12)**
	(A)	What is Supervised Learning Problem? Discuss with an example.	
	(B)	Explain in detail Artificial Neural Networks (ANN).	
	(C)	Write a short note on Self Organizing Map (SOM).	
	(D)	Explain the term Overfitting and Accuracy as a performance measure.	
Q2.		**Attempt the following (any Two)**	**(12)**
	(A)	Explain in detail the Selection operator in evolutionary computation and discuss Roulette Wheel Selection procedure.	
	(B)	Write a short note on Canonical Genetic Algorithm.	
	(C)	Explain Finite State Machines as an application of Evolutionary Programming.	
	(D)	Explain in detail Differential Evolution algorithm.	
Q3.		**Attempt the following (any Two)**	**(12)**
	(A)	What is Particle Swarm Optimization? Explain Local Best PSO in detail.	
	(B)	Explain the types of division of labour performed in social insects.	
	(C)	Write a short note on Ant Colony Optimization Technique.	
	(D)	Explain Social Structures for PSO.	
Q4.		**Attempt the following (any Two)**	**(12)**
	(A)	Explain the role of membership function for fuzzy sets.	
	(B)	Discuss the different types of Immunities.	
	(C)	Write a short note on Intrusion Detection system.	
	(D)	Explain the terms fuzzification and defuzzification.	
Q5.		**Attempt the following (any Two)**	**(12)**
	(A)	Discuss various aspects that have an influence on the performance of supervised NNs.	
	(B)	Write a short note on Coevolution and its types.	
	(C)	Define Artificial Culture. Explain Basic Cultural Algorithm.	
	(D)	Explain the Life Cycle of Lymphocytes.	
